



AMES
LABORATORY

SITE SUSTAINABILITY PLAN FY2018

DECEMBER 15, 2017



Ames Laboratory

Creating Materials & Energy Solutions

U.S. DEPARTMENT OF ENERGY

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1. Executive Summary

INTRODUCTION

Ames Laboratory is a government-owned, contractor operated, facility located at and operated by Iowa State University, Ames, Iowa. Ames Laboratory creates materials, inspires minds to solve problems, and addresses global challenges. Ames' mission focus is on materials science, engineering, analytical instrumentation and chemical sciences that provides expertise to the Department of Energy (DOE) laboratory system in the areas of energy and environmental improvement. Ames operates the Materials Preparation Center (MPC) which provides capabilities in preparation, purification, fabrication and characterization of materials in support of R&D programs throughout the world. Ames also collaborates with the DOE's applied energy technology and nonproliferation programs and supports the National Institutes of Justice, Department of Defense, various law enforcement agencies, and corporate entities. Ames Laboratory leads the Critical Materials Institute (CMI), bringing together the expertise of DOE national laboratories, universities, and industry partners to focus on technologies that make better use of materials and eliminate the need for materials that are subject to supply disruptions.

Ames Laboratory's commitment to meet the DOE sustainability goals through projects, tasks, and activities begins with the integration of the Environmental Management System (EMS) into the Integrated Safety Management System (ISMS) to ensure the implementation of safety and environmental management in all aspects of Laboratory work, from planning to completion.

Ames Laboratory uses its Environmental Management System (EMS) and the associated Steering Committee (EMSSC) as a vehicle to provide awareness of the objectives and targets laid out in EO 13693 to Laboratory employees. The EMSSC has adopted the Site Sustainability Plan objectives and targets and proposes initiatives to assist in the achievement of these goals, such as the Ames Laboratory Employee Commuting (ALEC) web application that allows employees to track their commuting information for more accurate data regarding green commuting in an effort to reduce the Scope 3 Green House Gases.

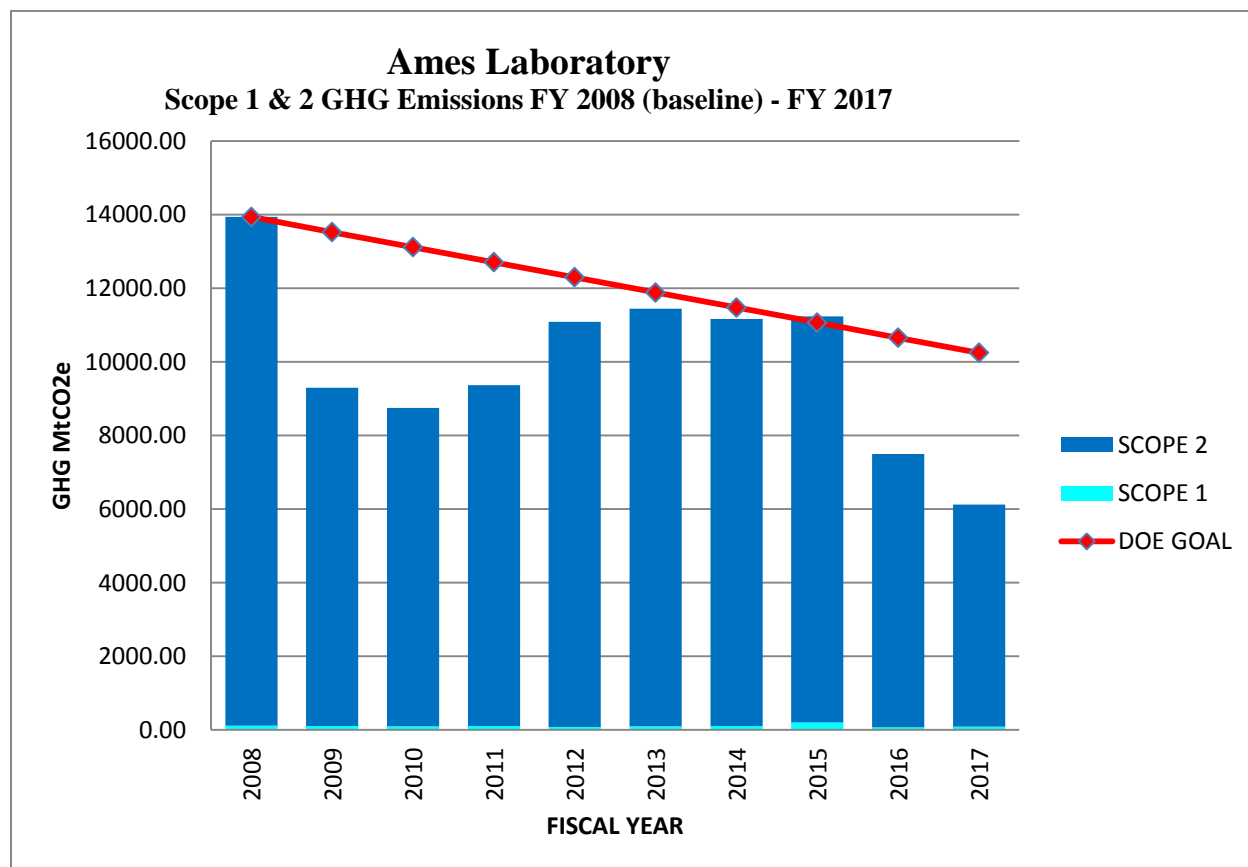
The age of the facilities makes it very challenging to achieve energy efficiency and sustainability in the existing facilities. However, Ames' success in purchasing renewable energy in the form of wind power has been noted by the Sustainability Performance Office: "Ames has made impressive strides in this goal area, and the SPO would like to share these successes." In FY2016, NREL screened Ames Laboratory for cost-effective renewable energy opportunities that would lower the site's 25-year lifecycle cost of energy. This screening found that while there is an incentive for Photovoltaic (PV) use, "the current low cost of utility electricity and average solar resource makes it difficult for PV to be cost-competitive".

Ames Laboratory has met the Fleet Reduction Goal of 35% and 75% of the remaining fleet vehicles, are Alternative Fuel Vehicles (AFV). Additionally, Ames Laboratory has increased its usage of AF by 1,488% from FY 2005 to FY 2017 and has met the overall goal of 10% annual increase between 2005 and 2015.

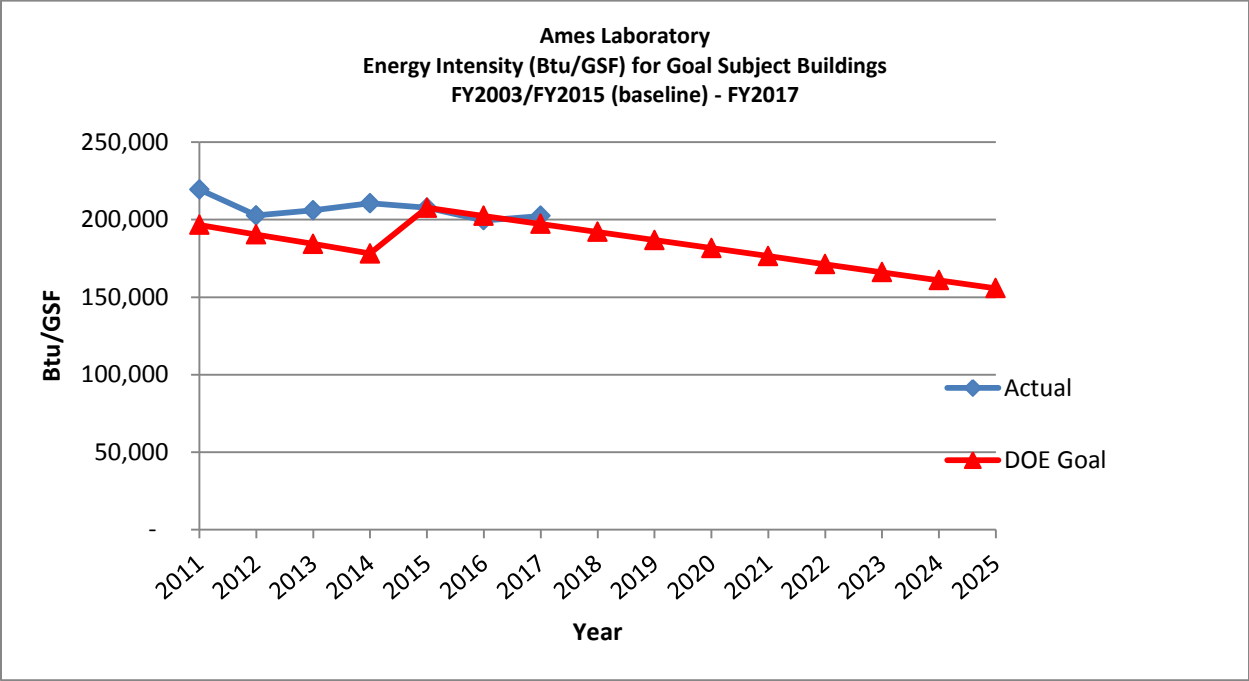
Ames Laboratory completed installation of required advanced electric meters in FY 2010 and is in the process of identifying and prioritizing sub-metering to meet the requirements of E. O. 13693.

An FY 2016 project replaced the roof on TASF and coupled with taking possession of the SIF building, the cool roof total is up from 13% to 30.6% of the Ames Laboratory total roof area.

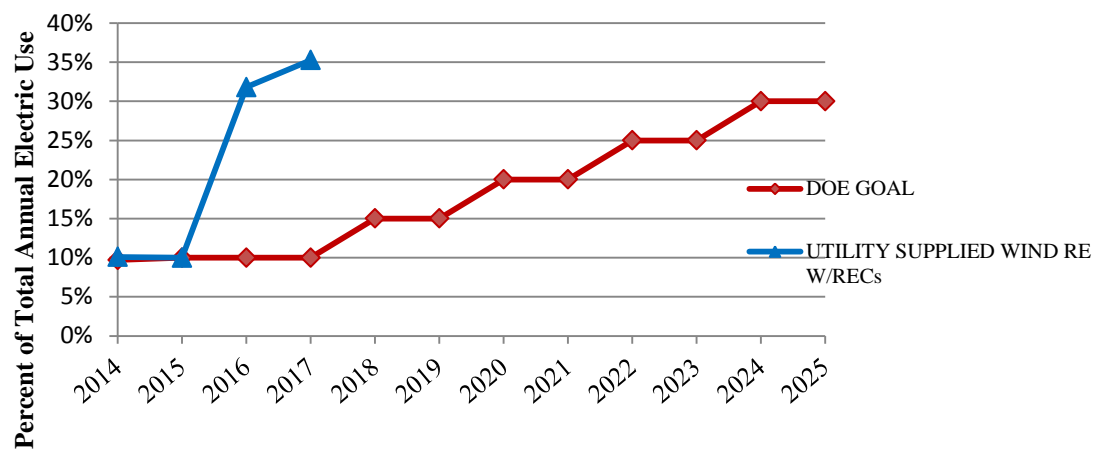
Ames Laboratory had achieved compliance with the High Performance and Sustainable Buildings (HPSB) guiding principles at 15% of the existing buildings at the site. With the addition of a new building the compliance has fallen to 12.5% which is short of the goal. Ames continues to implement the guiding principles in all of the major buildings where it is economically justified. The SIF building, which the Laboratory took possession of in FY 2016, meets the requirements for LEED Certified and is currently being evaluated for compliance with the Revised HPSB Guiding Principles.



FY	SCOPE 1 GHG (MtCO ₂ e)	SCOPE 2 GHG (MtCO ₂ e)
2008	114.28	13,823
2009	107.24	9,191
2010	99.61	8,654
2011	106.83	9,261
2012	78.60	11,013
2013	96.44	11,346
2014	106.79	11,059
2015	201.54	11,037
2016	75.67	7,418
2017	90.24	6,031



Ames Laboratory Renewable Electric Energy



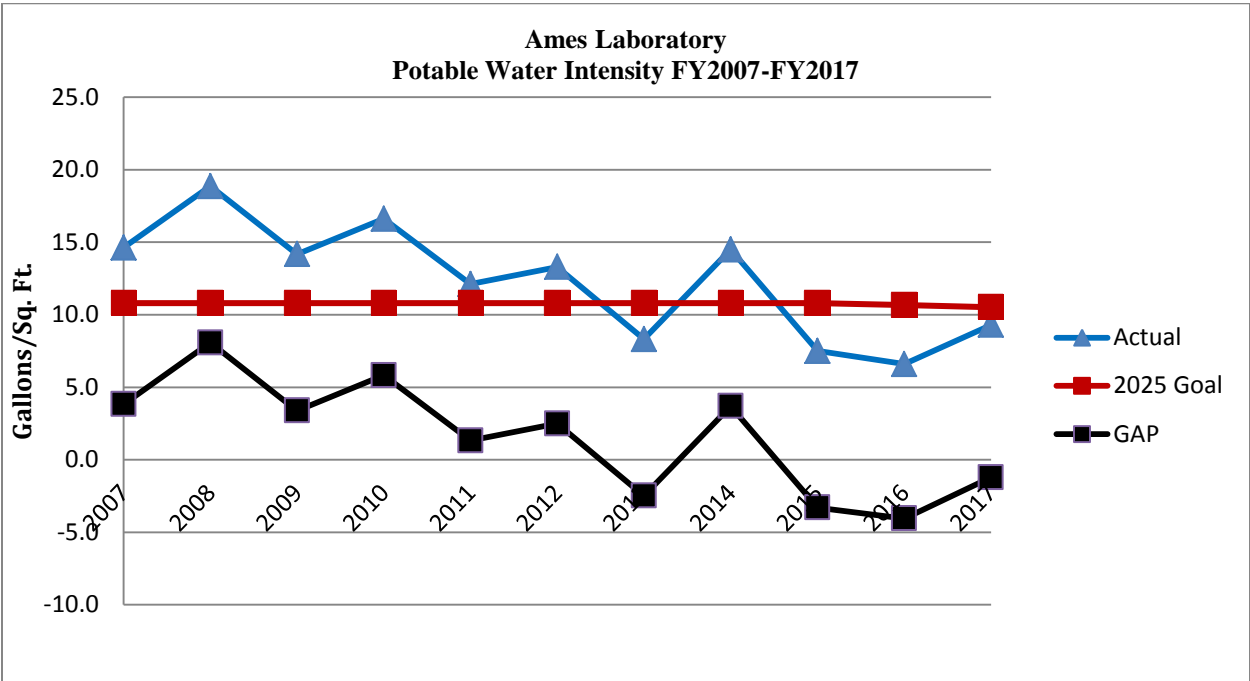
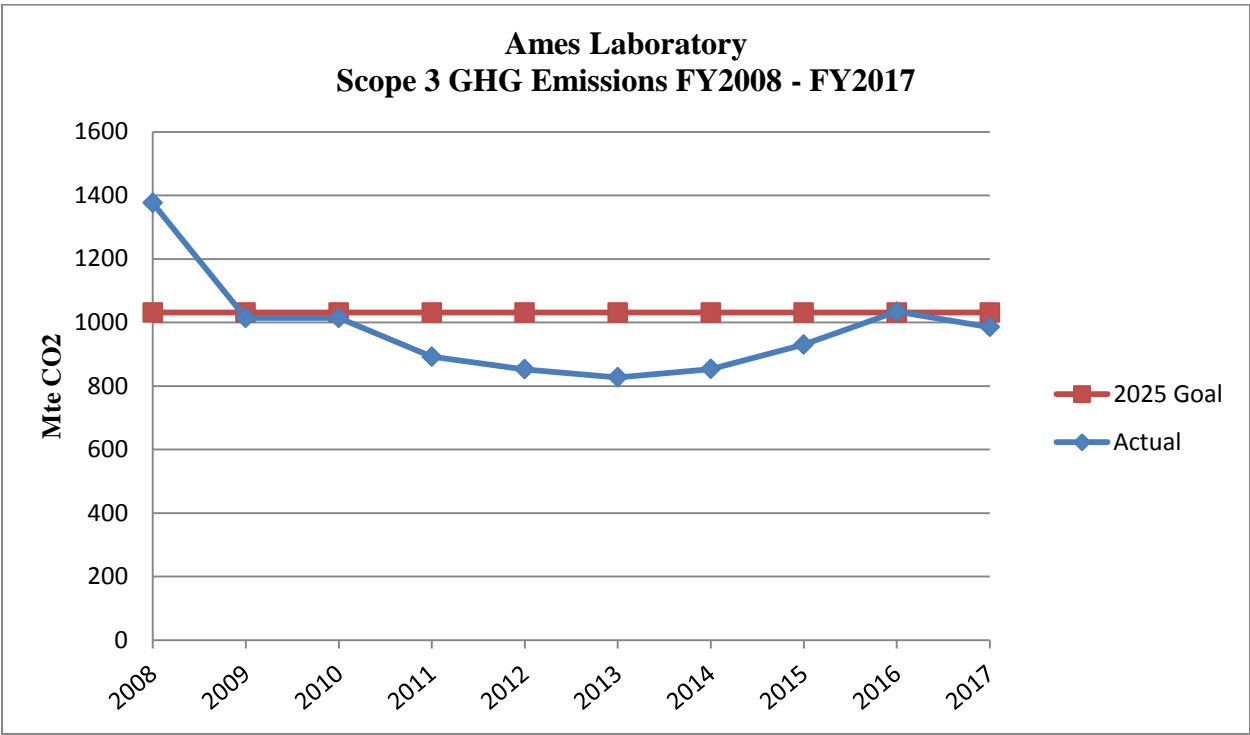


Table 1 - Executive Summary Table of DOE Sustainability Goals based on the SSPP and new Executive Order 13693

SSPP Goal #	DOE Goal	Performance Status through FY 2016	Planned Actions & Contribution	Risk of Non-attainment
<i>Goal 1: Greenhouse Gas Reduction</i>				
1.1	50% Scope 1 & 2 GHG reduction by FY 2025 from a FY 2008 baseline (2017 target: 19%)	Decreased from 13,937 MTCO2e baseline to 6,259 MTCO2e in FY17. Cumulative percent reduction at the end of FY17: 55.1% FY08 Baseline: 13,937MTCO2e FY25 Goal: 6,968 MTCO2e	Focus on energy conservation, particularly the energy sources associated with Scope 2 GHG emissions.	L
1.2	25% Scope 3 GHG reduction by FY 2025 from a FY 2008 baseline (2016 target: 7%)	Decreased from 1,034 MTCO2e in FY16 to 986 MTCO2e in FY17. Cumulative percent decrease at the end of FY17: 28.4% FY08 Baseline: 1,376 MTCO2e FY25 Goal: 1,031 MTCO2e	Continue to utilize wind generated electricity to lower emissions. Reduce business travel and reduce Scope 3 GHG emissions. Hybrid parking spaces incentivize use of fuel efficient vehicles.	L

SSPP Goal #	DOE Goal	Performance Status through FY 2016	Planned Actions & Contribution	Risk of Non-attainment
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Goal 2: Sustainable Buildings

2.1	25% energy intensity (Btu per gross square foot) reduction in goal-subject buildings, achieving 2.5% reductions annually, by FY 2025 from a FY 2015 baseline	decreased from 201,067 Btu/gsf in FY15 to 179,645 Btu/gsf in FY17. Cumulative reduction at the end of- FY 17: 10.7% FY 15 Baseline: 207,627 Btu/gsf.	Implement energy conservation projects described in the SSP that are estimated to achieve minimal additional reduction compared to baseline. AL will work to identify and implement additional ECMs toward meeting goals.	H
2.2	EISA Section 432 energy and water evaluations	Complete energy and water audits of all covered facilities prior June, 2017.	Review at least 25% of covered space each year to achieve 100% review within 4 year cycle.	L
2.3	Meter all individual buildings for electricity, natural gas, steam and water, where cost-effective and appropriate ³	100% of all utilities metered, electrical with advanced metering. 80% of appropriate buildings have individual steam meters. 0% of appropriate buildings have individual chilled water meters, 100% of chilled water is metered.	Continue to evaluate economics of chilled water sub-meters to meet requirements of HPSB program requirements	H
2.4	At least 17% (by building count or gross square feet) of existing buildings greater than 5,000 gross square feet (GSF) to be compliant with the <i>revised</i> Guiding Principles for HPSB by FY 2025, with progress to 100% thereafter	Currently one (1) building (12.5%) at the Ames Laboratory meets the current HPSB GPs. The SIF building is LEED Certified and is currently being evaluated against the <i>revised</i> Guiding Principles for HPSB	Re-certify existing, compliant building to new standards and continue to pursue compliance of remaining buildings.	L

SSPP Goal #	DOE Goal	Performance Status through FY 2016	Planned Actions & Contribution	Risk of Non-attainment
2.5	Efforts to increase regional and local planning coordination and involvement	Assess opportunities for additional participation and input into local and regional planning through the structures of the contractor.		L
2.6a	Net Zero Buildings: 1% of the site's existing buildings above 5,000 gross square feet intended to be energy, waste, or water net-zero buildings by FY 2025.	Plan development continues.	Continue to develop plan to implement requirements by specified deadline.	L
2.6b	Net Zero Buildings: All new buildings (>5,000 GSF) entering the planning process designed to achieve energy net-zero beginning in FY 2020.	No new buildings currently being planned at the Ames Laboratory.	Include requirement in design specifications should a new building enter the planning stage.	

Goal 3: Clean & Renewable Energy

3.1	"Clean Energy" requires that the percentage of an agency's total electric and thermal energy accounted for by renewable and alternative energy shall be not less than: 10% in FY 2016-2017, working towards 25% by FY 2025.	11% of Ames Laboratory overall electrical and thermal energy use in FY17 was renewable. Ames Laboratory met this goal through the purchase of additional renewable electrical energy.	Continue to purchase green wind energy documented by bundled RECs to offset thermal energy and meet goals.	L
3.2	"Renewable Electric Energy" requires that renewable electric energy account for not less than 10% of a total agency <u>electric</u> consumption in FY16-17, working towards 30% of total agency <u>electric</u> consumption by FY 2025.	In 2017 35 % of the electrical energy used at AL was from renewable sources. Goal met.	Continue to increase the use of renewable electric energy at AL.	L

SSPP Goal #	DOE Goal	Performance Status through FY 2016	Planned Actions & Contribution	Risk of Non-attainment
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Goal 4: Water Use Efficiency and Management

4.1	36% potable water intensity (Gal per gross square foot) reduction by FY 2025 from a FY 2007 baseline. (2016 target: 18%)	Cumulative percent decrease at the end of: FY17: 36.3%. Goal met. FY07 Baseline: 14.6 gallons per sf FY25 Goal: 9.34 gallons per sf	Identify and implement additional water conservation measures to meet FY2025 goals.	L
4.2	30% water consumption (Gal) reduction of industrial, landscaping, and agricultural (ILA) water by FY 2025 from a FY 2010 baseline. (2016 target: 12%)	Ames Laboratory does not consume any water for industrial, landscaping, or agricultural use.	N/A	L

Goal 5: Fleet Management

5.1	30% reduction in fleet-wide per mile greenhouse gas emissions reduction by FY 2025 from a FY 2014 baseline (2016 target: 3%; 2017 target: 4%).	From FY2014 to FY2016 the GHG emissions per-mile decreased from 715 to 429 or approximately 40% FY2025 goal met.	Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as models become available.	L
5.2	20% reduction in annual petroleum consumption by FY 2015 relative to a FY 2005 baseline; maintain 20% reduction thereafter (2016 target: 20%).	Cumulative percent reduction at the end of FY17: 71.3% FY05 Baseline: 891 gallons. Goal is met.	Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as models become available.	L
5.3	10% increase in annual alternative fuel consumption by FY 2015 relative to a FY 2005 baseline; maintain 10% increase thereafter (2016 target: 10%).	Increased from a baseline of 55 gal. to 629 gal. in FY17. Goal is met.	Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as models become available.	L

SSPP Goal #	DOE Goal	Performance Status through FY 2016	Planned Actions & Contribution	Risk of Non-attainment
5.4	75% of light duty vehicle acquisitions must consist of alternative fuel vehicles (AFV). (2016 target: 75%)	Currently 100% of the Ames Laboratory fleet consists of AFVs. Complete	Ames Laboratory will continue to work with GSA to continue to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet.	L
5.5	50% of passenger vehicle acquisitions consist of zero emission or plug-in hybrid electric vehicles by FY 2025. (2016 target: 4%)	The Laboratory does not have passenger vehicles and has no plans to acquire passenger vehicles.		L

Goal 6: Sustainable Acquisition

6.1	Promote sustainable acquisition and procurement to the maximum extent practicable, ensuring Bio-Preferred and bio-based provisions and clauses are included in 95% of applicable contracts.	The Purchasing Department reviews acquisitions for sustainability requirements. Ames Laboratory had one (1) construction contract in FY 2017 that required the Sustainable Acquisition Program (DEAR 952.223-78) flowdown.	Continue to develop formal lab-wide policies requiring procurement of products and/or services which support sustainability. Provide end users listings of environmentally preferred products for furniture, printing and office supplies.	L
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Goal 7: Pollution Prevention & Waste Reduction

7.1	Divert at least 50% of non-hazardous solid waste, excluding construction and demolition debris.	4.2% of the non-hazardous solid waste from the Ames Laboratory is recycled and/or diverted from landfilling. An additional 53.9% is used to produce electricity and offset fossil fuels. Overall 58% of the non-hazardous solid waste from the Ames Laboratory is diverted from landfilling	58% of the non-hazardous solid waste from the Ames Laboratory is recycled and/or diverted from landfilling. Most of the diverted refuse is burned to offset fossil fuel in the City of Ames Municipal Power Plant allowing the laboratory to claim only 4.2% as diverted.	L
7.2	Divert at least 50% of construction and demolition materials and debris.	46% of the construction and demolition debris generated in FY 2017 was diverted to be recycled.	The Laboratory will investigate ways to divert more C&D material for recycling.	L

SSPP Goal #	DOE Goal	Performance Status through FY 2015	Planned Actions & Contribution	Risk of Non- attainment
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Goal 8: Energy Performance Contracts

8.1	Annual targets for performance contracting to be implemented in FY 2017 and annually thereafter as part of the planning of section 14 of E.O. 13693.	Legacy contamination issues and a lack of high return projects limit the opportunities to engage in an ESPC at the AL.		H
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Goal 9: Electronic Stewardship

9.1	Purchases – 95% of eligible acquisitions each year are EPEAT-registered products.	Goal was met. 100% of eligible electronics acquisitions met EPEAT or FEMP Energy Star standards.	Continue to monitor purchases to ensure compliance	L
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9.2	Power management – 100% of eligible PCs, laptops, and monitors have power management enabled.	Currently 100% of eligible devices at the Ames Laboratory have Power Management enabled.	Effort to implement power management and energy efficiency settings for Linux and Macintosh systems continue.	L
9.3	Automatic duplexing – 100% of eligible computers and imaging equipment have automatic duplexing enabled.	100% of eligible computers and imaging equipment have automatic duplexing enabled.		L

SSPP Goal #	DOE Goal	Performance Status through FY 2015	Planned Actions & Contribution	Risk of Non-attainment
9.4	End of Life – 100% of used electronics are reused or recycled using environmentally sound disposition options each year.	In FY 17, 100% of used electronics were reused or set aside for recycling using environmentally sound disposition options.	Continue to dispose of used electronics in an environmentally sound manner.	L
9.5	Data Center Efficiency. Establish a power usage effectiveness target in the range of 1.2-1.4 for new data centers and less than 1.5 for existing data centers.	Current PUE for existing data center is 2.4 which does not meet goal.	Evaluate data center for additional ECMs and evaluate data provided by additional metering.	L

Goal 10: Climate Change Resilience

10.1	Update policies to incentivize planning for, and addressing the impacts of climate change.	The Laboratory does not currently have a specific climate change adaptation plan.	Climate change Vulnerability Screening completed. Developing plan for comprehensive resiliency assessment in FY 18.	L
10.2	Update emergency response procedures and protocols to account for projected climate change, including extreme weather events.	On going.	Climate change Vulnerability Screening completed. Developing plan for comprehensive resiliency assessment in FY 18.	L
10.3	Ensure workforce protocols and policies reflect projected human health and safety impacts of climate change.	The Laboratory does not currently have a specific climate change adaptation plan.	Climate change Vulnerability Screening completed. Developing plan for comprehensive resiliency assessment in FY 18.	L
10.4	Ensure site/lab management demonstrate commitment to adaptation efforts through internal communications and policies.	The Laboratory does not currently have a specific climate change adaptation plan.	Climate change Vulnerability Screening completed. Developing plan for comprehensive resiliency assessment in FY 18.	L
10.5	Ensure that site/lab climate adaptation and resilience policies and programs reflect best available current climate change science, updated as necessary.	The Laboratory does not currently have a specific climate change adaptation plan.	Climate change Vulnerability Screening completed. Developing plan for comprehensive resiliency assessment in FY 18.	L

2. Performance Review and Plan Narrative

Goal 1: Greenhouse Gas Reduction

1.1: 50% Scope 1 & 2 GHG Reduction by FY 2025 from a FY 2008 baseline.

Performance Status

The FY2017 Scope 1 & 2 GHG emissions for Ames Laboratory were 55% lower than they were in FY 2008. The reduction was primarily due to increased energy efficiency and replacing 2253 MWh of coal-fired electric power with wind power.

Projected Performance

Primary reductions in GHG at Ames Laboratory will be in Scope 2 GHGs by continuing to address energy efficiency, focusing extra efforts on those areas that produce the most GHG. As we reduce site energy usage, the amount of GHG produced will also be decreased. One method of reducing GHG production is by replacing the coal generated electricity currently utilized by the Laboratory with a larger percentage of wind energy which would be accounted for by receiving the retired REC's. Ames Laboratory has the potential of purchasing up to 100% of its electricity from wind generating sources.

On-Site Power Production

Ames Laboratory does not have on-site generating capacity nor sufficient space to install on-site power generation. Additionally, on-site renewable energy screening efforts found that current low utility costs are prohibitive to installation of renewable energy options.

Purchasing Off-Site dedicated renewable or carbon-free electrical energy

Ames Laboratory is purchasing off-site wind power through the Midwest grid at a premium to obtain the associated RECs to ensure the renewable, carbon free energy purchased by the Laboratory is dedicated to the Laboratory alone.

Purchasing RECs

Renewable electricity w/bundled RECs sufficient for Thermal Energy Offset.

	Actual FY15	Actual FY16	Actual FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Renewable Energy(MWHs) Plan	630	2,100	2253	2,765	2,765	3,508	3,508	4,386	4,386	5,396	5,396
Actual/Planned/ Estimated Premium Cost	\$2,205	\$7,350	\$7,884	\$9,677	\$9,677	\$12,279	\$12,279	\$15,349	\$15,349	\$18,886	\$18,886
Unit Costs (\$/MWHs)	\$3.50	\$3.50	\$3.50	\$3.50	\$3.50	\$3.50	\$3.50	\$3.50	\$3.50	\$3.50	\$3.50

SF6 Reduction

The Laboratory's usage/storage of SF6 is mainly for research equipment (electron microscopes). Maintenance procedures on the microscopes will typically release 1-2 lbs. of SF6 each year.

In addition, the Laboratory has two pieces of underground switchgear each with a capacity of 19.5 pounds of SF6. Both switches were replaced in FY 2015 with units constructed of stainless steel which will eliminate the leaks and stop the SF6 release.

Based on the amount of SF6 used, it is not cost effective to purchase recovery equipment. Iowa State University Facilities, Planning and Management has recovery equipment available for use when necessary.

Barriers to Achieving the Goal

Please refer to the Barriers statement for the energy reduction goals. Meeting the reduction goals for Scope 1 and 2 GHG at the Ames Laboratory depends directly on the ability of the Laboratory to meet the energy intensity reduction goals.

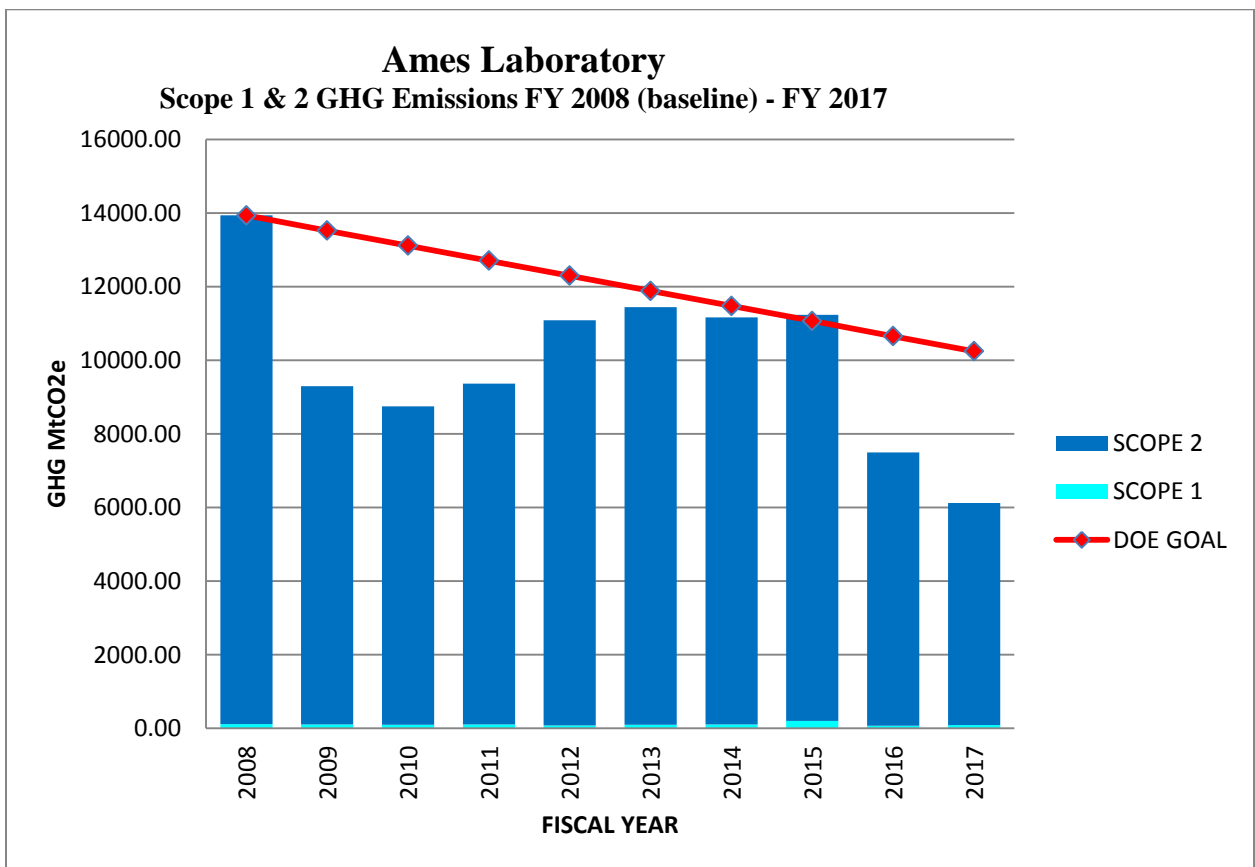


Fig. 1.1

1.2: 25% Scope 3 GHG reduction by FY 2025 from a FY 2008 baseline

Performance Status

The FY 2017 inventory of Scope 3 GHG attributable to activities at Ames Laboratory show a decrease in output to 986 mteCO₂ or a decrease of 28% compared to the FY 2008 baseline, meeting stated goals. Current status and gap analysis are illustrated in Figures 1.2 and 1.3.

Projected Performance

Ames Laboratory continues to pursue strategies to encourage in-house videoconferencing and teleconferencing where feasible and provide opportunities to attend meetings and training events remotely, reducing employee travel and the associated energy consumption and Scope 3 GHG emissions. Additionally, hybrid vehicles are available for rent through Iowa State University Transportation Services.

Ames Laboratory encourages the use of hybrid vehicles for commuting through preferred parking. Additionally, Iowa State University, the contractor that operates the Ames Laboratory, coordinates a van pooling program and supports the use of mass transportation through support of the City of Ames mass transit bus system, CyRide. Employees are encouraged to self-report their commute information through a web application proposed by the Laboratory's Environmental Management System Steering Committee. Through this application, Figure 1.4, employees can track their commute mileage, and method: walking, cycling, car/van pool, mass transit or single occupant vehicle. This information is used along with Human Resource records for those employees who choose not to report for determination of commute Scope 3 GHG.

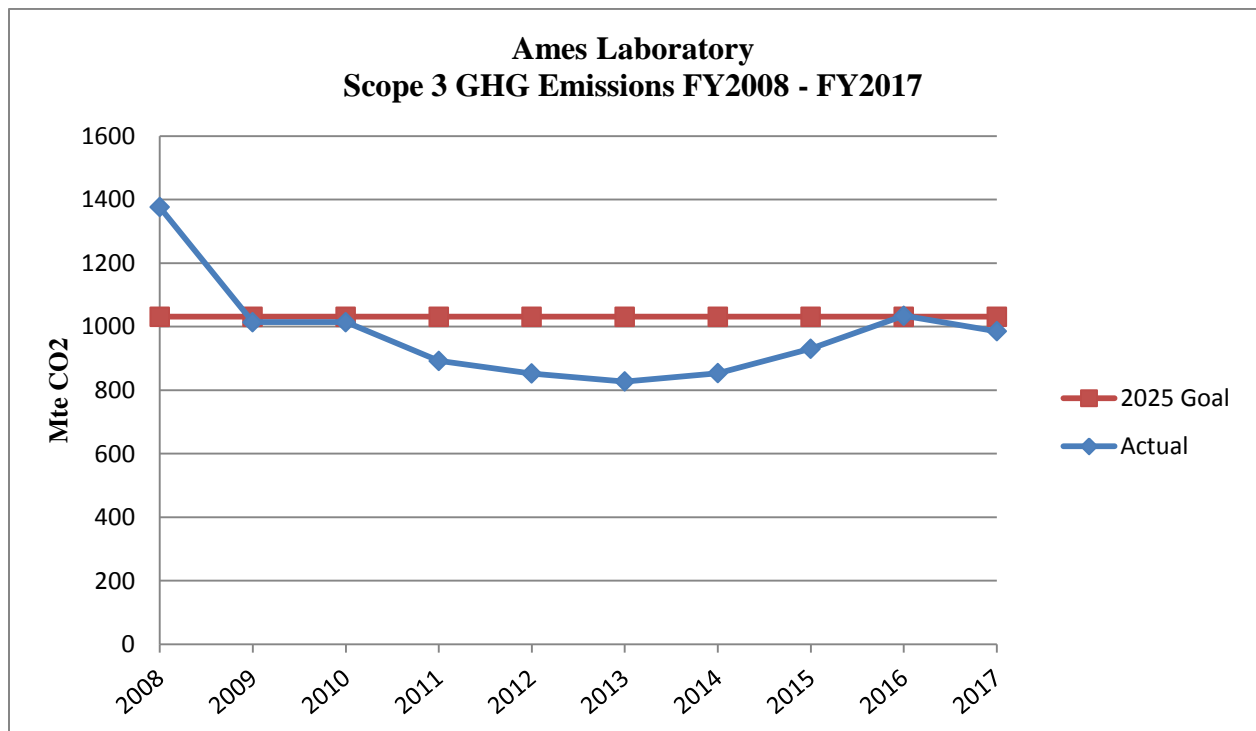


Fig. 1.2

YEAR	Scope 3 Emissions (mteCO2)	GAP to 2020 Goal	GAP to 2025 Goal
2008	1376	178.9	N/A
2009	1014 (Est.)	(183.0)	N/A
2010	1014	(183.0)	N/A
2011	892	(305.0)	N/A
2012	852	(345.0)	N/A
2013	826	(370.2)	N/A
2014	853	(344.0)	N/A
2015	930	(267)	(101)
2016	1034	N/A	3
2017	985	N/A	N/A

Fig. 1.3

Ames Laboratory Employee Commuting (ALEC) 2016-11-02

[Home](#) | [Account](#) | [My Vehicles](#) | [Calendar](#) | [Delete Commute](#)

To add a commute, please follow these easy steps:

1. Enter your start and end date for your commute. For example, if your mode of transportation (i.e., car) is consistent, enter your start date as October 1, 2012 and your end date as September 30, 2013.
2. Check the "Default Commute" check box and the computer will use the daily information automatically. The only time you need to update your commute is if you have no commute days or use a different mode of transportation.
3. Select your mode of transportation. [Use "No Commute" if you don't come to work because of business travel, medical, or vacation].
4. If you use the same mode of transportation (i.e., car) to work and return home daily, enter your total round trip mileage. If you use multiple modes of transportation daily (i.e., bus and walk), enter each mode separately, using the same date range. Enter your mileage for each mode of transportation. If these are your primary modes of transportation, check the default box for each mode of transportation.

Note: Please do not include errands or home for lunch. The only action is your mode of transportation from home to work and return to home from work.

Note: You can change your default at any time by entering a new mode of transportation and re-checking the default check box. Otherwise, your default will use your last default setting.

Action	Distance Traveled	Method	Passenger	Date
delete	3.0	Walk	0	2016-09-26

Add new commute here

Start Date : End Date :

Default Commute: ☐

Method of Transportation :

Bike

Bike

Car

Mass Transit

Motorcycle

No Commute

Van Pool

Walk

Commute Distance :

Tutorial

Your Distance :

Number of trips: 522

Total miles traveled: 1566.0 miles

Trips around the world: 0.063

Default Commute Status:

Your commute '3.0 miles by -Walk' is set as default

Contact us | Questions/Comments- alec@ameslab.gov

Fig. 1.4

Goal 2: Sustainable Buildings

2.1: 25% energy intensity (Btu per gross square foot) reduction in goal-subject buildings, achieving 2.5% reductions annually, by FY 2025 from a FY 2015 baseline.

Performance Status

Energy Intensity

Dashboard Bench Mark energy usage established for FY 2015 shows as 201,067 Btu/sq. ft. and indicates a FY 2017 value of 179,645 Btu/sq. ft., a decrease of 10.7% compared to FY 2015 baseline. This result is obtained by not including the green, renewable wind energy that was purchased.

If the Energy Intensity at the Ames Laboratory is calculated including the purchased green energy the Bench Mark energy usage established for FY 2015 at 207,627 Btu/sq. ft. and the corresponding use in FY 2017 is 202,186 Btu/sq. ft., a decrease of 2.5% compared to FY 2015 baseline.

Numerous factors influence the level of energy use at the Laboratory. Weather and utility outages are random, unquantifiable, and beyond the control of the Laboratory. As a significant portion of the energy use at the Ames Laboratory is for environmental control, annual variations in weather can significantly impact energy usage.

Fume Hood Monitoring

Ames Laboratory continues to monitor fume hoods for proper setback when not in use. The hood surveillance program goal is to further reduce energy and conditioned air loss by communicating operational discrepancies in FY 2017.

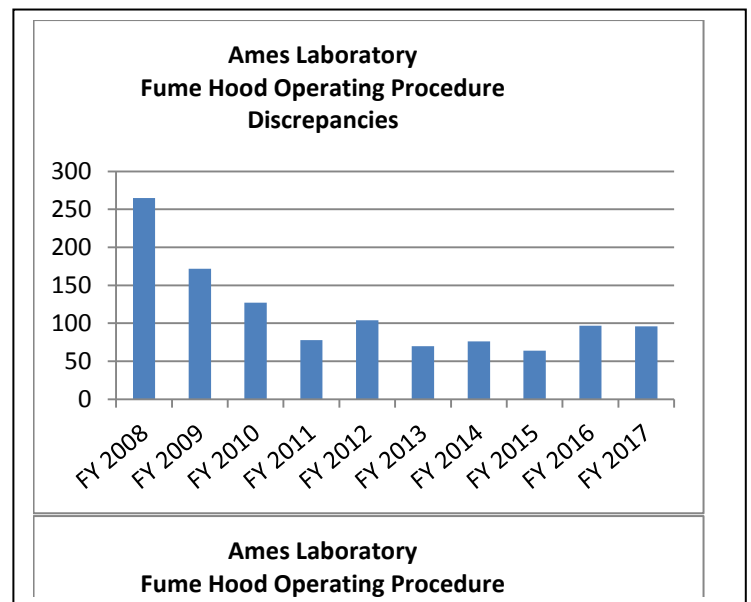
The Ames Laboratory utilizes a variable volume fume hood exhaust system that can provide for significant energy savings when operated properly. New employees are trained in proper operation of the fume hood controllers in General Employee Training and during program specific training. In addition, operating instructions are posted on each hood. (Fig 2.1)

Ames Laboratory Plant Protection Personnel observe hood status as they perform patrols during the evenings and on weekends. Fume hoods found not being operated in an energy efficient manner are marked with a sticker. (Fig 2.2)

Once the hood is marked, the responsible Program Director and Group Leader are notified via Daily Discrepancy Report, emailed by the Plant Protection Personnel each morning and noted again in the Monthly Discrepancy Report emailed at the end of each month.

Since starting the hood surveillance program, procedural violations related to hood operation have been reduced by approximately 76%. (Fig 2.3)





Projected Performance

Energy Saving Performance Contract

No ESPC is currently being developed at the Ames Laboratory.

Upgrade Spedding Hall Windows

Spedding Hall has a total of 144 windows among the ground, first, second, third, and penthouse floors. They are metal frame, single pane, and fixed type. These window systems are energy inefficient, with low thermal resistance and poor shading characteristics, meaning that they do not effectively inhibit the transfer of heat and direct sunlight. This project considers replacing the existing windows with new double pane "low emissivity" windows, which have almost double the thermal resistance and shading performance, as well as a greatly reduced air infiltration rate around the frame. The new windows will save energy and money expended to heat and to cool the Hall. This project is currently scheduled for FY2018.

Energy Conservation Project - Lighting Upgrades

Ames Laboratory has approximately 3,300 lighting fixtures that contain older lighting technology, fluorescent or incandescent light sources. These fixtures use magnetic ballasts and T12 fluorescent lamps or screw-in type incandescent lamps. While functional, such lamps are less efficient than current technology lighting systems and consume more electricity than current technology fixtures. In addition, the less efficient fixtures generate a larger cooling load during summer months. Ames Laboratory is in the process of retro fitting the existing lighting fixtures with current technology lighting sources. At the end of FY 2017, approximately 70% of the candidate light fixtures had been upgraded.

The lighting retrofits will focus on the following strategies to reduce energy consumption and operating and maintenance (O&M) costs, and improve the quality of light:

- Reducing the number of lamps and ballasts and different types of lamps.
- Electronic ballasts and 28-watt fluorescent lamps will be used to reduce existing lighting wattage per square foot.
- Where possible and cost effective, led fixtures will be utilized to further reduce power consumption.

Construction of Facilities

The construction of the Sensitive Instrument Facility (SIF) is complete and this building is part of the Ames Laboratory energy reporting beginning in FY 2016. The current evaluation of LEED points indicates that the building is LEED Certified. A full evaluation against the revised HPSB Guiding Principles is in progress.

Retro Fit Building HVAC

In FY 2017, Ames Laboratory completed the process of retro fitting the entire HVAC system of Spedding Hall which was nearly 70 years old. The retro fit converted the system from a zoned constant-volume reheat system to a variable-volume system with climate control in each lab or office space. In addition to the improved control, the project will eliminate the energy waste from unnecessary use of reheat and will save fan energy.

Re-purposing Under Utilized Space

Ames Laboratory is currently in the process of evaluating existing, under-utilized space for possible conversion.

Retro Commissioning of Existing Buildings

Ames Laboratory did not perform retro-commissioning activities in FY 2017.

Fume Hood Monitoring

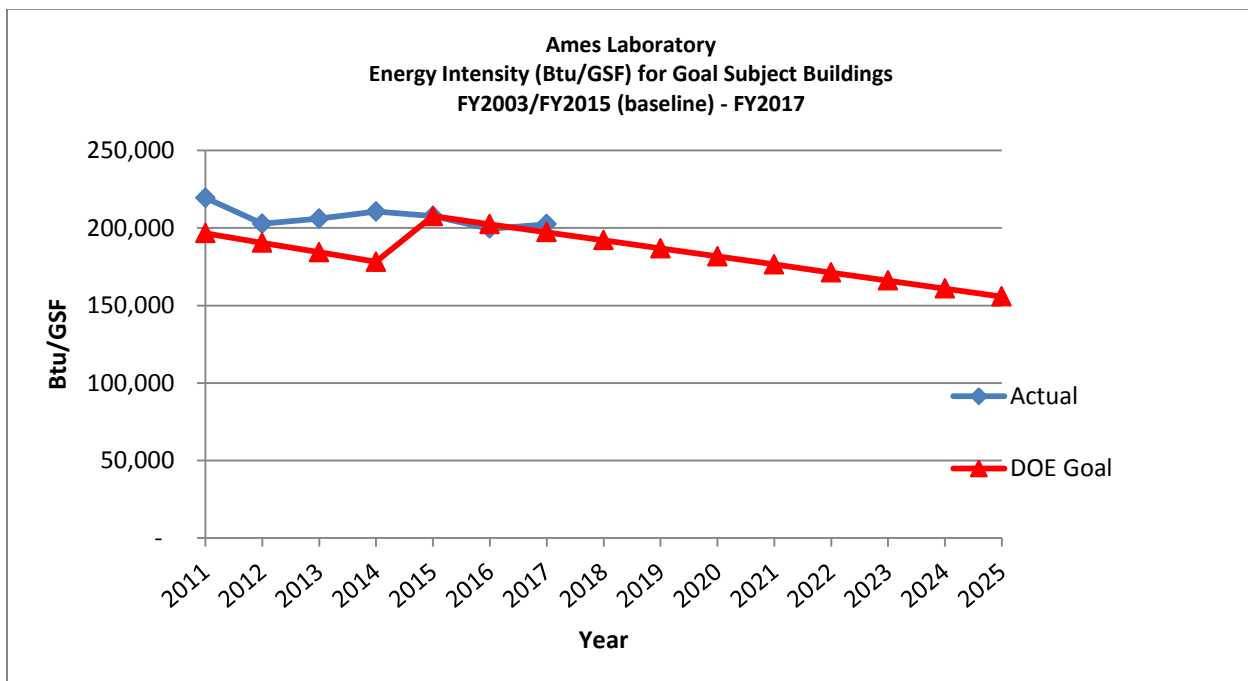
Ames Laboratory will continue its hood surveillance program with a goal to reduce fume hood operational discrepancies again in FY 2018.

Energy Efficiency Metrics Table

	2015	2017
Gross Square Feet	327,664	340,968
Total Buildings		
Energy Use (MBtu)	68,030	68,939

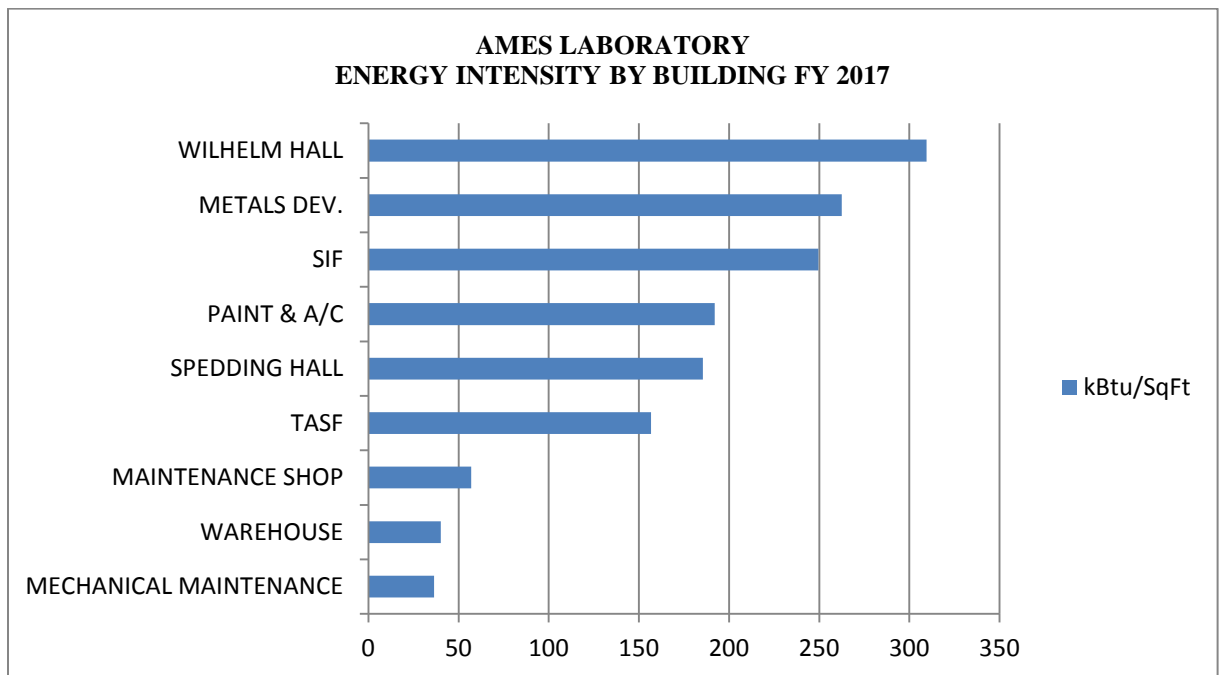
ESPC Project or separate Energy Conservation Measure	Actual or Estimated Energy Saved MBtu/yr	Percent of Base Energy Use/Square Foot	Actual or Estimated Implementation Cost	Expected Year of Implementation	Funding Source (ESPC, UESC, Overhead, GPP, Other)	
Upgrade Spedding Hall Windows	1,124	1%	\$1000K	2018	GPP	

Gap Analysis



YEAR	USE Btu/Sq. Ft.	GAP Btu/Sq. Ft.	Conservation project	Energy savings Btu/Sq Ft	Funding source
2015	207,622	0	Revised Goal = 2015 Intensity - 2.5%/yr. thru 2025		
2016	199,566	2,870			
2017	202,186	-4,941			

FY 2025 Goal = 155,720 Btu/Sq.Ft.



BUILDING	kBtu/SqFt
MECHANICAL MAINTENANCE	36
WAREHOUSE	40
MAINTENANCE SHOP	57
TASF	157
SPEDDING HALL	185
PAINT & A/C	192
SIF	250
METALS DEV.	263
WILHELM HALL	310

Note that the Retro-Commissioning and the Spedding Hall HVAC upgrade are multi-year projects and the majority of the energy savings should already be accounted for in the actual use numbers through FY2012.

Barriers to Achieving the Goal

Currently identified ECMs do not provide sufficient energy savings to achieve the 25% reduction in energy intensity by 2025.

2.2: EISA Section 432 energy and water evaluations, benchmarking, project implementation, and measures follow up.

Performance Status

With the addition of the SIF last fiscal year Ames Laboratory is re-evaluating which buildings should be designated as covered facilities to ensure that the covered facilities account for 85% of the energy used at Ames Laboratory. It is anticipated that with the next EISA 432 reporting cycle at least one more facility at the Ames Laboratory will be designated as covered.

All buildings have been benchmarked with Portfolio Manager.

Projected Performance

Ames Laboratory did comply with EISA Section 432 energy and water review cycle requirements prior June, 2017.

2.3: Meter all individual buildings for electricity, natural gas, steam and water, where cost-effective and appropriate.

Performance Status

All utilities used at Ames Laboratory are 100% metered, either by advanced meters or standard meters. Gaps do exist in the area of sub-metering, especially for chilled water where a single meter serves 5 buildings.

Projected Performance

Ames Laboratory is developing a plan to sub-meter chilled water and steam for TASF as a path toward meeting the requirements of the HPSB program for existing buildings and metering requirements.

2.4 At least 17% (by building count or gross square feet) of existing buildings greater than 5,000 gross square feet (GSF) to be compliant with the *revised* Guiding Principles for HPSB by FY 2025, with progress to 100% thereafter.

Performance Status

With the addition of a new building, the percentage of Ames Laboratory buildings certified as compliant with the original HPSB Guiding Principles has fallen to 12.5%.

Projected Performance

The SIF building, which the Laboratory took possession of in FY 2016, meets the requirements for the equivalent of LEED Certified and should meet the current HPSB Guiding Principles bringing the Laboratory to 25% of the Laboratory building inventory compliant with the original HPSB Guiding Principles.

The Ames Laboratory will evaluate the revised Guiding Principles and develop a plan to ensure 17% of existing buildings are compliant by 2025.

Barriers to Achieving the Goal

A lack of building-dedicated sub-metering will make it difficult to certify several of our buildings.

2.5 Efforts to increase regional and local planning coordination and involvement.

Performance Status

Ames Laboratory facilities personnel have regular interaction with City of Ames Electric Department personnel regarding utility supply issues including locally-generated renewable power, REC's, pricing, incentive programs, and other topics.

The contractor has significant interaction with state and local officials regarding transportation issues. The contractor participates in the Ames Area Metropolitan Planning Organization. This organization includes state, county, and city officials.

The contractor supports CyRide, the local city bus system. It is a collaboration between the City of Ames, Iowa State University, and ISU's Government of the Student Body. The contractor has representation on the CyRide transit board.

Contractor leadership has been instrumental in attracting funding for a regional transit intermodal facility. The grant application was a collaboration between the contractor, the City of Ames, and CyRide.

The Laboratory is represented on various planning and advisory groups with the contractor and local officials. The Manager of Facilities and Engineering Services represents the Laboratory on the Traffic Advisory Council which provides input to contractor management on traffic issues. The Laboratory also provides a representative to sit on the Transportation Advisory Council, which provides information and user-group opinions to the contractor on all things pertaining to the movement of people and vehicles to, from, and around campus. Another example of Ames Laboratory involvement is participation in a planning group to improve traffic flow and safety near the Laboratory, especially for pedestrians and bicyclists.

Projected Performance

Assess opportunities for additional participation and input into local and regional planning through the structures of the contractor.

2.6a Net Zero Buildings - Existing Buildings.

Performance Status

Ames Laboratory has not begun the process of evaluating this goal, or the development of a strategy to meet the requirements of the goal.

Projected Performance

Ames Laboratory will assess the definitions of Net Zero and develop a plan to evaluate all buildings against that definition and select the buildings that will be most likely to meet the requirements prior to 2025.

2.6b Net Zero Buildings – New Buildings.

Performance Status

Currently the Ames Laboratory has no new buildings in the design process and, as such, has not begun the process of evaluating this goal, or the development of a strategy to meet the requirements of the goal.

Projected Performance

Ames Laboratory will assess the requirements of this goal should a new building enter the design process.

Goal 3: Clean & Renewable Energy

3.1 “Clean Energy” requires that the percentage of an agency’s total electric and thermal energy accounted for by renewable and alternative energy shall be not less than: 10% in FY 2016-2017, working towards 25% by FY 2025.

Performance Status

In FY 2017 11% of the Ames Laboratory total electric and thermal energy was accounted for by renewable wind energy. Ames Laboratory purchased additional wind derived electricity to meet the requirements of this goal. Meeting this goal for the thermal energy offsets cost the Laboratory an additional \$5,649 in green energy premiums. The additional premium cost to meet the goal for electrical energy is discussed in the following section.

Projected Performance

As Ames Laboratory does not generate any of its own utilities the opportunity to directly utilize “clean energy” does not exist. Therefore Ames Laboratory will continue to meet this requirement through the purchase of bundled wind energy or offsetting RECs in a quantity sufficient to account for the goal required percentages.

Clean Energy Metrics Table

RECs		Total RECs/yr	Funding Source	Expected Year of Implementation
WIND RECs	Actual	0	Overhead	FY2015
WIND RECs	Actual	1,440	Overhead	FY2016
WIND RECs	Actual	1,614	Overhead	FY2017
WIND RECs	Projected	1,661	Overhead	FY2018
WIND RECs	Projected	1,937	Overhead	FY2019
WIND RECs	Projected	2,214	Overhead	FY2020
WIND RECs	Projected	2,491	Overhead	FY2021
WIND RECs	Projected	2,768	Overhead	FY2022
WIND RECs	Projected	3,045	Overhead	FY2023
WIND RECs	Projected	3,321	Overhead	FY2024
WIND RECs	Projected	3,460	Overhead	FY2025

Note: This table shows the RECs required to meet only the required TERMAL energy offset.

3.2 “Renewable Electric Energy” requires that renewable electric energy account for not less than 10% of a total agency electric consumption in FY16-17, working towards 30% of total agency electric consumption by FY 2025.

Performance Status

To comply with renewable and clean energy goals, in FY2017 the Ames Laboratory purchased 2253 MWh of renewable wind generated electrical power and the associated Renewable Energy Certificates (RECs) at a cost premium of \$7,884 to cover the cost of processing the RECs. This amount is approximately 35.3% of the Laboratory’s FY 2017 electric energy consumption and meets the 10% requirement for FY2017.

Projected Performance

The Ames Laboratory will continue to meet renewable energy goals through the purchase of renewable wind energy (bundled with the associated RECs) from our supplying utility. The City of Ames, which supplies electricity to Ames Laboratory, has sufficient wind energy available to supply up to 100% of the needs of the Laboratory. Ames Laboratory will be able to meet the requirement of 30% of annual electricity consumption from renewable sources by FY 2025 and thereafter.

Waiver

The Ames Laboratory has been granted a waiver for the on-site renewable energy generation requirement.

Renewable Electric Energy Metrics Table

Renewable Energy including RECs		Total MWh/yr	Funding Source	Expected Year of Implementation
WIND W/RECs	Actual	635	Overhead	FY2014
WIND W/RECs	Actual	630	Overhead	FY2015
WIND W/RECs	Actual	661	Overhead	FY2016
WIND W/RECs	Actual	639	Overhead	FY2017
WIND W/RECs	Projected	895	Overhead	FY2018
WIND W/RECs	Projected	1,119	Overhead	FY2019
WIND W/RECs	Projected	1,268	Overhead	FY2020
WIND W/RECs	Projected	1,492	Overhead	FY2021
WIND W/RECs	Projected	1,641	Overhead	FY2022
WIND W/RECs	Projected	1,865	Overhead	FY2023
WIND W/RECs	Projected	2,014	Overhead	FY2024
WIND W/RECs	Projected	2,238	Overhead	FY2025

Note: This table shows the RECs required to meet only the required ELECTRICAL energy offset.

Goal 4: Water Use Efficiency and Management

4.1 36% potable water intensity (gallons per gross square foot) reduction by FY 2025 from a FY 2007 baseline.

Performance Status

The Ames Laboratory has meter data for all domestic water usage for the base year of FY 2007. Total consumption in the base year is 4,792 kgal or 14.6 gal./sq.ft. Water consumption for FY 2017 was 3,181 kgal or 9.3 gal./sq.ft. a decrease of 36% compared to the base year water use intensity.

The goal is met.

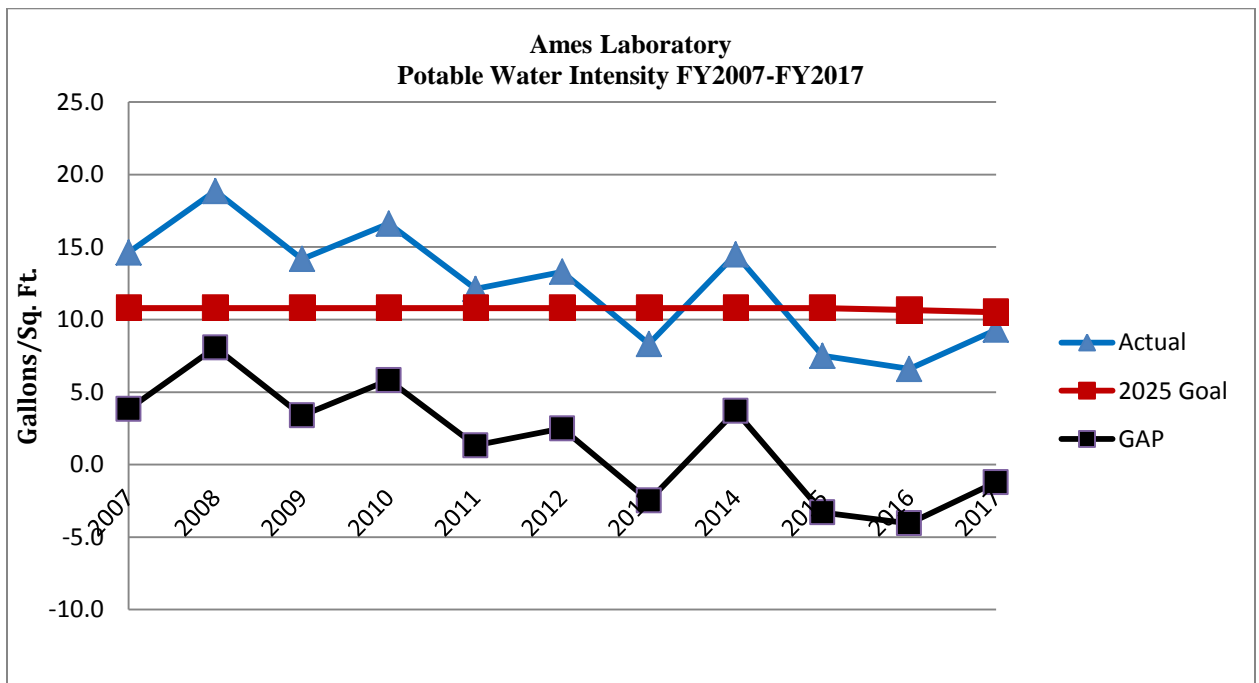
Projected Performance

Continuously upgrading to water conserving toilets and retrofitting of urinal valves is being accomplished on an extended schedule as budgets permit and general maintenance replacements demand.

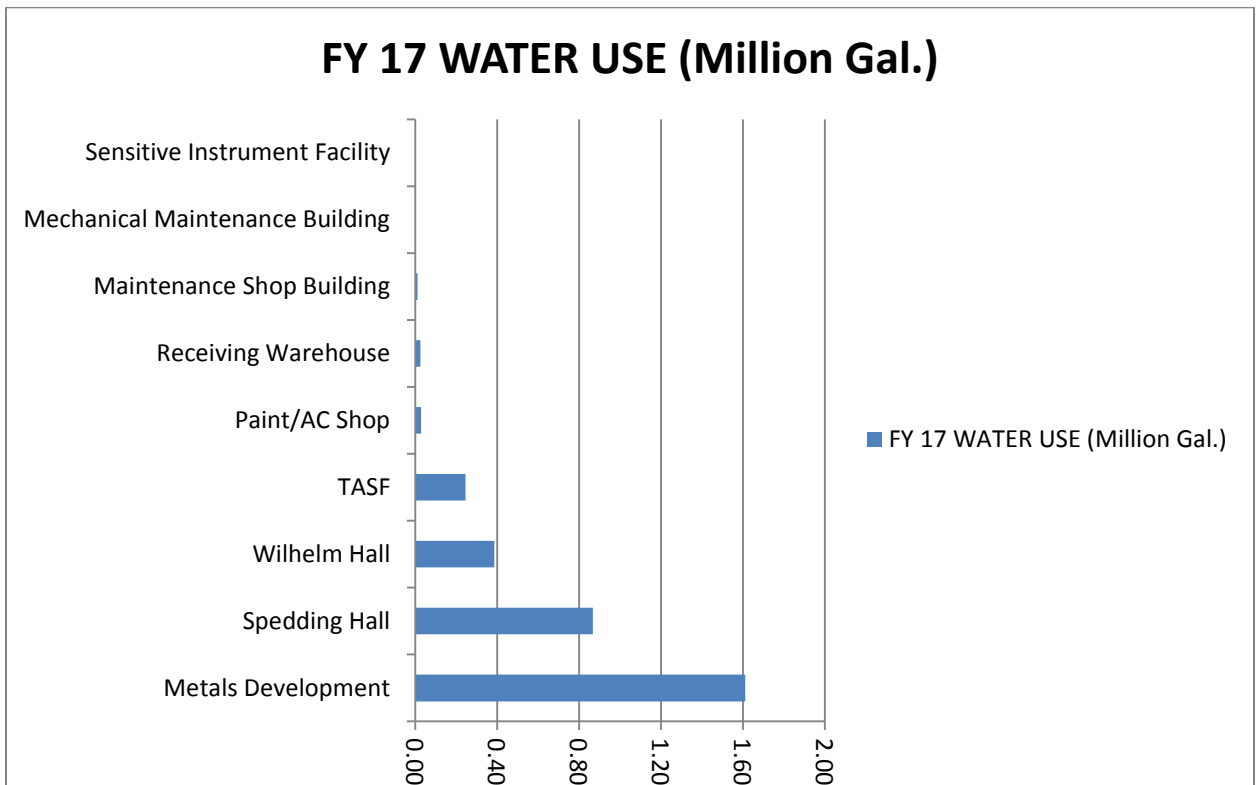
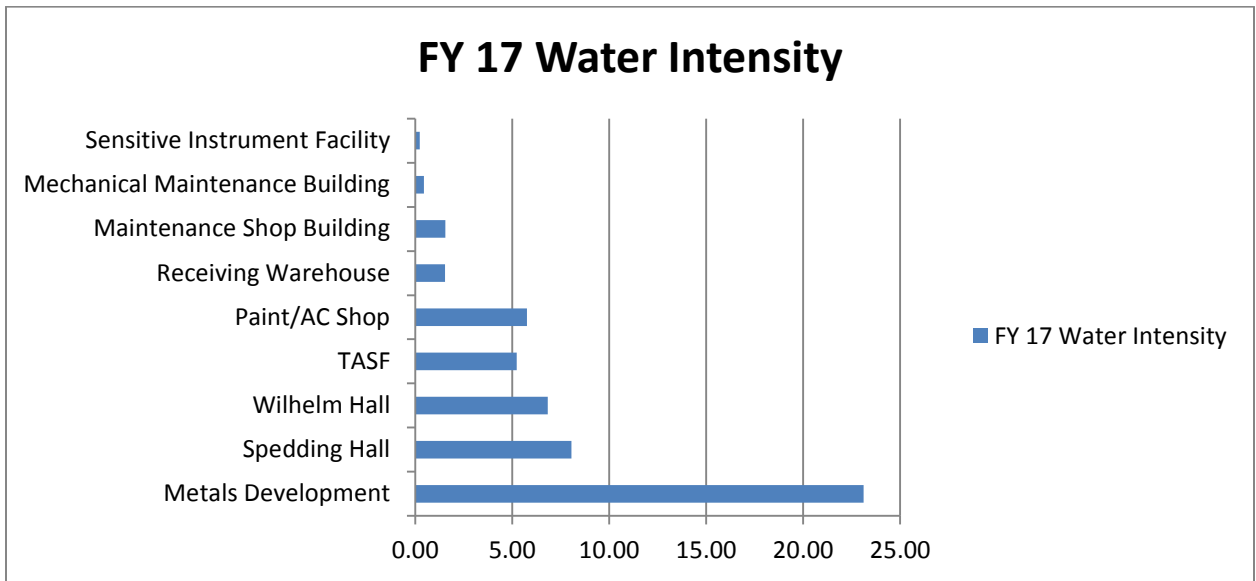
New Facilities

The Sensitive Instrument Facility (SIF) was completed at the beginning of FY 2016, adding high performance facilities to our inventory which helped improve water intensity metrics.

Gap Analysis



2025 Goal = 3,186 Kgal.



YEAR	USE (Kgal)	GAP (Kgal)
2007	4,793	1,246
2008	6,184	2,638
2009	4,647	1,101
2010	5,446	1,900
2011	3,971	425
2012	4,355	809
2013	2,725	-821
2014	4,742	1,196
2015	2,473	-1,073
2016	2,251	-935
2017	3181	-5

Barriers to Achieving the Goal

Performance against this goal can vary greatly from year-to-year. On those occasions when the campus chilled water system is out of service, tap water is used to cool critical loads. The Laboratory is more likely to meet or exceed the goal reduction during years when there are fewer outage situations that are of short duration compared to those years that may have multiple outages or an outage of long duration such as occurred in FY 2014.

Upgrading to water conserving toilets and retrofitting of urinal valves will be accomplished on an extended schedule as budgets permit and general maintenance replacements demand. The Ten-Year Site Plan shows a project projected for FY 2023 that has, as yet undefined, water conservation components.

4.2: 30% consumption reduction of industrial, landscaping, and agricultural (ILA) water by FY 2025 from a FY 2010 baseline.

Ames Laboratory does not utilize water for industrial, landscaping or agricultural purposes. The goal does not apply.

Goal 5: Fleet Management

5.1 30% reduction in fleet-wide per-mile greenhouse gas emissions by FY 2025 from a FY 2014 baseline (2016 target: 3%; FY 2017 target: 4% reduction)

Performance Status

Ames Laboratory has reduced its fleet-wide per-mile greenhouse gas emissions by 40% from 2014. This has been accomplished through reducing fleet size and expanded use of alternative fuel. The use for the remaining four vehicles remains relatively static in recent years.

Projected Performance

Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as vehicles become available to lease.

5.2 20% reduction in annual petroleum consumption by FY 2015 relative to a FY 2005 baseline; maintain 20% reduction thereafter.

Performance Status

Ames Laboratory has reduced its annual petroleum consumption by 60.3% from 2005. This has been accomplished through reducing fleet size and expanded use of alternative fuel. The use for the remaining four vehicles remains relatively static in recent years.

Projected Performance

Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as vehicles become available to lease.

5.3 10% increase in annual alternative fuel consumption by FY 2015 relative to a FY 2005 baseline; maintain 10% increase thereafter.

Performance Status

Ames Laboratory increased its usage of alternative fuel from 55 gallons in FY 2005 to 873 gallons in FY 2017, or by 1,487%. This goal was exceeded.

Projected Performance

Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as vehicles become available to lease.

5.4: 75% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV) by 2015 and each year thereafter.

Performance Status

100% of the light duty vehicles are AFV and overall 75% of the vehicles in Ames Laboratory's fleet are AFVs.

Projected Performance

Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet.

5.5: 20% of passenger vehicle acquisitions consist of zero emission or plug-in hybrid electric vehicles by 2020, working towards a goal of 50% by 2025

Performance Status

Ames Laboratory does not have any passenger vehicles – the goal is not applicable.

Projected Performance

Ames Laboratory does not have plans to acquire any passenger vehicles.

Goal 6: Sustainable Acquisition

6.1: Promote sustainable acquisition and procurement to the maximum extent practicable, ensuring BioPreferred and biobased provisions and clauses are included in 95% of applicable contracts.

Performance Status

All construction subcontracts contain BioPreferred and sustainable acquisition clauses as prescribed in the Prime Contract.

Commercial off-the-shelf items purchased by the Laboratory are reviewed in advance of purchase to comply with EPEAT, FEMP, Energy Star, BioPreferred, WaterSense and recycled content. Compliance is tracked through the Purchase Order system where reports can be generated for reporting and tracking purposes.

Data is annually entered into the sustainability dashboard and DOE's GreenBuy award system on FedCenter. The Laboratory will be eligible for a Bronze GreenBuy award for sustainable purchases in FY2017.

Projected Performance

The Purchasing office continues to address and update its practices as new sustainable requirements are added.

Goal 7: Pollution Prevention and Waste Reduction

7.1: Diverting at least 50 % of non-hazardous solid waste, excluding construction and demolition debris, by the end of FY 2015.

Performance Status

The Laboratory's non-hazardous solid waste is processed at the City of Ames resource recovery plant which diverts 58% of the material from landfill through various forms of recycling. Of the material diverted from the landfill, 93% was diverted to produce refuse derived fuel to replace a portion of the coal used to generate electricity.

The Laboratory has a robust recycling program that keeps the Laboratory's solid waste generation low. The Ames Laboratory recycling program includes, but is not limited to, batteries, paper, cardboard, metal, fluorescent tubes and used oil.

The Laboratory participates in the U. S. Government excess system to allow usable equipment and materials to be utilized by other agencies. In addition, the Laboratory's EMSSC championed a goal for unused equipment to be re-used within the lab. The Equipment Pool Website, Figure 7.1, allows Ames Laboratory employees to access a list of available equipment with pictures, history and functional information.

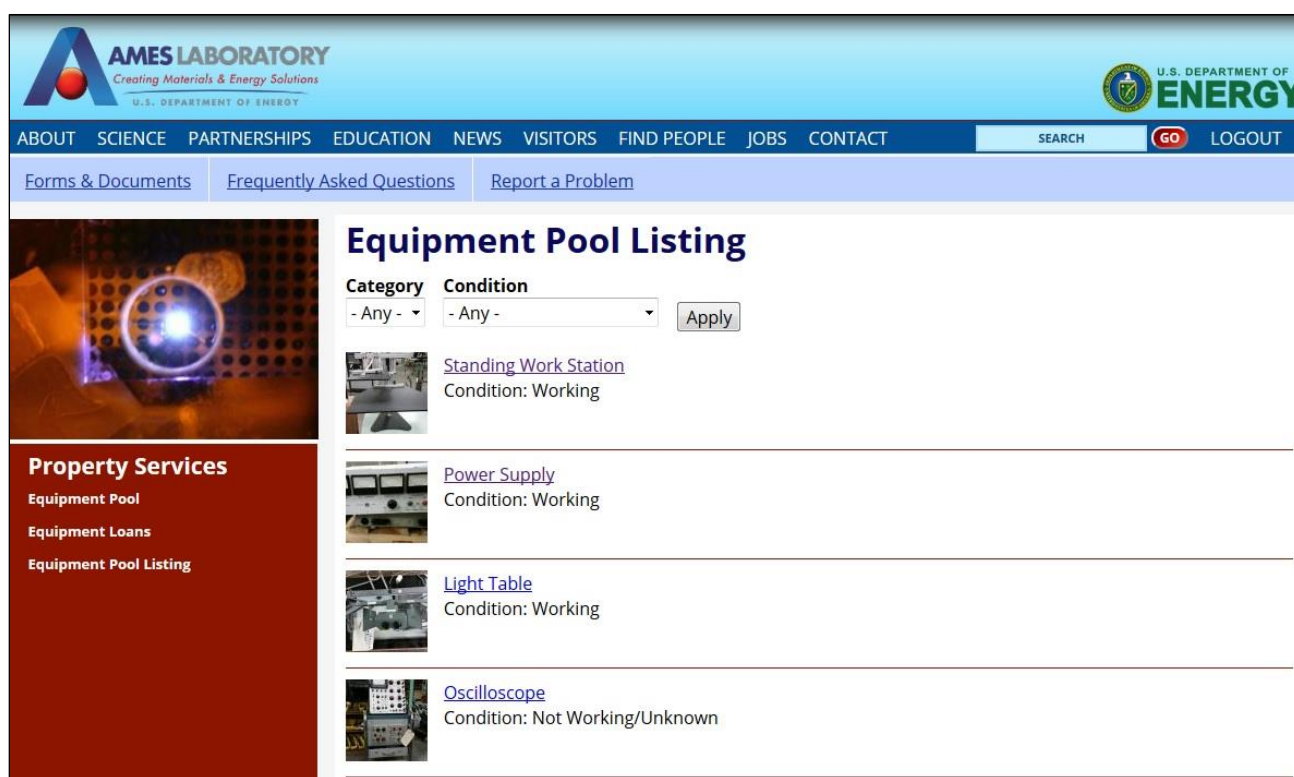


Fig. 7.1

Projected Performance

Ames Laboratory continually tries to find ways to reduce its environmental footprint. The Laboratory's EMSSC meets quarterly to consider new practices, activities and programs that will reduce the Laboratory's environmental footprint. The committee makes recommendations to the Executive Council that will help mitigate significant environmental aspects, meet DOE targets and objects and align with best practices in sustainability.

Barriers to Achieving the Goal

The non-hazardous solid waste, excluding construction and demolition debris, generated by the Laboratory is co-mingled with the non-hazardous solid waste generated by Iowa State University making it impractical, at best, to obtain accurate data on the actual amount of non-hazardous solid waste the Laboratory actually generates.

Additionally, the hallmark of the City of Ames Resource Recovery Plant is the diversion of a significant amount of refuse (53% - 72%) from land filling and into refuse derived fuel used to offset fossil fuels in the generation of electricity for the City of Ames. Until the Ames Laboratory is allowed to account the refuse derived fuel (waste-to-energy) as diverted, it is unlikely the Laboratory will be able to achieve this goal.

7.2: Diverting at least 50 % of construction and demolition materials and debris by the end of FY 2015.

Performance Status

In FY 2017 the Laboratory diverted 46% of the construction and demolition materials generated by the Laboratory during FY 2016.

Projected Performance

During FY2018 the Laboratory will continue to develop methods to track the amount of construction and demolition material is generated each year.

Ames Laboratory continually tries to find ways to reduce its environmental footprint. The Laboratory's Environmental Management System Steering Committee (EMSSC) meets quarterly to consider new practices, activities and programs that will reduce the Laboratory's environmental footprint. The committee makes recommendations to the Executive Council that will help meet DOE goals.

Barriers to Achieving the Goal

Due to a limited number of local recycling paths for construction and demolition debris, diversion costs can be higher than landfilling.

Goal 8: Energy Performance Contracts.

No ESPC is currently being developed at the Ames Laboratory.

Goal 9: Electronic Stewardship

9.1: Purchases – 95% of eligible acquisitions each year are EPEAT-registered products.

Performance Status

For fiscal year 2017, 100% of eligible purchases made by the Laboratory were EPEAT.

The Laboratory procurement office reviews all requisitions for EPEAT, Energy Star and FEMP, when required. For EPEAT, the purchasing office ensures the device requested is registered on the EPEAT website. If it is not registered, the purchasing office finds another device that is EPEAT that will meet requirements. The agents also review specs for FEMP and/or Energy Star for applicable items. Supporting documentation is printed and placed in the Purchase Order file for audit verification. It is also tracked via text codes in the Laboratory's ERP system. Each PO with an EPEAT, Energy Star or FEMP designation has a special text code in the PO line. The purchasing agents also track any purchases that are not EPEAT, Energy Star or FEMP so that the Laboratory can ensure its overall percentage at the end of each fiscal year.

Projected Performance

The Laboratory procurement office will continue to review all requisitions for EPEAT compliance.

9.2: Power management - 100% of eligible desktops, laptops, and monitors have power management enabled.

Performance Status

For FY 2017 achieved power management of 100% of eligible computers and monitors. The implementation of power management and energy efficiency parameters for Windows systems is an ongoing process. The settings are distributed via Group Policy on Windows systems. Some power management and energy efficiency parameters are controlled in the BIOS settings and are set when standard baseline configurations are applied.

Projected Performance

Effort to implement power management and energy efficiency settings for Linux and Macintosh systems will be evaluated.

9.3 Automatic duplexing – 100% of eligible computers and imaging equipment have automatic duplexing enabled.

Performance Status

The use of print servers has been implemented to provide central print management. Automatic duplex printing is enabled for all duplex capable printers. End users are given the option to manually select single-sided printing for individual jobs.

9.4 End of Life – 100% of used electronics are reused or recycled using environmentally sound disposition options each year.

Performance Status

100% of the used electronics discarded by the Ames Laboratory in FY 2017 were disposed of through an environmentally sound recycling program.

The Laboratory has maintained a robust recycling practice for its electronic assets. All electronic devices that no longer work or are outdated have the hard drives removed and destroyed. The remaining is palletized and then recycled through a certified recycler. The Laboratory sent 4,885 kg of electronics for recycling in FY17.

Projected Performance

Ames Laboratory will continue to reuse or recycle used electronics.

9.5 Data Center Efficiency – Establish a power usage effectiveness target in the range of 1.2 – 1.4 for new data centers and less than 1.5 for existing data centers

Performance Status

The goal is not met. Due to UPS firmware issues, new metering and meter malfunctions, the Ames Laboratory data center PUE for FY 2017 was 2.4.

Additional equipment and metering was installed in this room during FY 2017. While the additional metering will allow a more accurate determination of the PUE and provide additional capability to monitor energy use in real time it has also raised questions as to what is actually being measured and whether those data points are appropriate.

Projected Performance

The Ames Laboratory will continue to evaluate loads measured to ensure an accurate PUE as well as identify additional ECMs to continue to improve the PUE. Additionally With the additional metering that was installed during FY 2017 the Laboratory will be able to measure the PUE in a more traditional manner over time rather than with momentary “snapshots” of performance which will allow a more accurate determination of the PUE and provide additional capability to monitor energy use in real time.

Goal 10: Climate Change Resilience

10.1 Update policies to ensure planning for, and addressing the impacts of, climate change.

Objective 1: Determining Risk

The screening tool indicated Ames Laboratory will require an in-depth study of the vulnerabilities facing the Laboratory. Ames Laboratory will evaluate methods to leverage our contractor and/or other laboratories in similar climate regions to perform this study.

Objective 2: Current Activities

The Laboratory does not currently have a specific climate change adaptation plan. The challenges identified as climate change related are, essentially, the same challenges identified in current Laboratory disaster recovery, continuity of operations and emergency response plans. These plans and programs are reviewed and updated annually, drawing on any lessons learned or changes in Laboratory activities since the last review. The Climate Change Vulnerability Screening performed at the Ames Laboratory utilizing the screening tool promulgated in January, 2017 indicated Ames Laboratory will require an in-depth study of the vulnerabilities facing the laboratory. Ames will evaluate methods to leverage our contractor and/or other Laboratories in similar climate regions to perform this study.

Objective 3: Future Activities

Climate change in Iowa is predicted to manifest, primarily, as weather and the impact of that weather. Nothing currently predicted by the climate modeling is outside the extremes this geographic area has been subjected to previously and which form the basis of existing response plans. The existing plans will continue to be reviewed and updated annually to account for lessons learned and changes in Laboratory activities and programming.

Objective 4: Real Property and Supply Chain Resilience

Ames Laboratory has not started the process to include consideration of climate adaptation and resilience into procurement, acquisition, real property or leasing decisions. With the completion of the initial screening in FY 2017 the preliminary work of identifying climate stressors and their impact has begun. In FY 2018 the Laboratory will work to identify those documents that require review and possible modification to ensure organizational resilience in the face of climate change.

Objective 5: Regional and Local Coordination

Ames Laboratory currently coordinates with the following regional and local entities for planning purposes on various levels and will continue to do so as climate change resilience is incorporated into current plans: Story County Emergency Management, Ames Fire Department, City of Ames Electric Department, Iowa State University Traffic Advisory Committee, ISU Police, ISU Environment, Health and Safety.

Objective 6: Removing and Reforming Barriers

With the completion of the initial screening in FY 2017 the preliminary work of identifying climate stressors and their impact has begun. In FY 2018 the Laboratory will

work to identify those documents that require review and possible modification to ensure organizational resilience in the face of climate change.

10.2 Update emergency response procedures and protocols to account for projected climate change, including extreme weather events.

Performance Status

Emergency Response Operations team conducted a table-top exercise in December of 2015 that involved a severe weather event at the Ames Laboratory's recently-constructed Sensitive Instrument Facility (SIF). The exercise included requirements to address hazard assessments and exercises; operational and natural phenomena impact; reliability and habitability of emergency response facilities and support equipment; and criteria for training and drills, including requirements that address facility conduct of operations drill programs and the interface with emergency response organizations. The table-top exercise progressed from Emergency Response to Continuity of Operations (Recovery) for a major event. In March of 2017, the Ames Laboratory conducted a severe weather drill that included the SIF.

Projected Performance

Enhancements learned from exercises include:

- Update the Emergency Plan to include emergency response procedures to SIF location
- Identify severe weather relocation areas
- Improve public address system to research (e.g., microscope cells) locations
- Develop procedure to address personnel relocation and evacuation processes
- Develop procedure for identifying off-hours users

10.3 Ensure workforce protocols and policies reflect projected human health and safety impacts of climate change.

Performance Status

The Laboratory does not currently have a specific climate change adaptation plan. The challenges identified as climate change related are, essentially, the same challenges identified in current Laboratory disaster recovery, continuity of operations and emergency response plans. These plans and programs are reviewed and updated annually, drawing on any lessons learned or changes in Laboratory activities since the last review.

10.4 Ensure site/lab management demonstrates commitment to adaptation efforts through internal communications and policies.

Performance Status

The Laboratory does not currently have a specific climate change adaptation plan. The challenges identified as climate change related are, essentially, the same challenges identified in current Laboratory disaster recovery, continuity of operations and

emergency response plans. These plans and programs are reviewed and updated annually, drawing on any lessons learned or changes in Laboratory activities since the last review.

10.5 Ensure that site/lab climate adaptation and resilience policies and programs reflect best available current climate change science, updated as necessary.

Performance Status

The Laboratory does not currently have a specific climate change adaptation plan. The challenges identified as climate change related are, essentially, the same challenges identified in current Laboratory disaster recovery, continuity of operations and emergency response plans. These plans and programs are reviewed and updated annually, drawing on any lessons learned or changes in Laboratory activities since the last review.

Projected Performance

Climate change in Iowa is predicted to manifest, primarily, as weather and the impact of that weather. Nothing currently predicted by the climate modeling is outside the extremes this geographic area has been subjected to previously and which form the basis of existing response plans. The existing plans will continue to be reviewed and updated annually to account for lessons learned, changes in Laboratory activities and programming and any changes in the available current climate change science.

10.6 Complete Dashboard climate change resiliency survey

Performance Status

Complete.

3. Fleet Management Plan

Ames Laboratory has four vehicles in its fleet, all of which are leased through GSA. The fleet consists of three vehicles that support E-85 and one diesel. All four vehicles are light duty or medium duty trucks which are used by the Materials Handling and the Facilities Services departments.

The vehicles are chosen based on meeting the mission of the Laboratory and what GSA has to offer through its leasing program. The Laboratory has assessed the minimum number of vehicles it requires to meet its mission. These four trucks are used to transport equipment and supplies throughout the Laboratory complex and Iowa State University. Each truck serves a specific purpose based on its configuration. One of the trucks is dedicated to the Materials Handling group and is enclosed with a box in order to perform year-round deliveries. It is specially ventilated with an internal racking system to safely transport gas or liquid cylinders and dewars. The other three trucks are part of the Laboratory pool, but are heavily used by Facilities Services. One truck is specially equipped and used seasonally for snow plowing. It also performs trailer towing for asbestos removal operations. The third truck is equipped with pipe racks to facilitate carrying pipe, conduit and steel. The fourth truck is used for larger and heavier

equipment and has a higher bed elevation. It has a stake bed and lift gate for use for ground loading and unloading.

Each year, the Laboratory submits a justification to its Contracting Officer as an annual review of the fleet. This serves as a review to ensure the Laboratory has the vehicles it needs to continue its mission.

GSA contacts Ames Laboratory to trade-in fleet. Since Ames Laboratory drives each truck between 1,800 and 2,500 miles annually, GSA replaces trucks approximately every six to ten years.

Since Ames Laboratory does not have an on-site refueling station, other filling stations in the city are used to refill the trucks. There are at least two stations in the city which sell E-85 gas.

Through the years, the Laboratory has decreased its fleet, and believes the optimal number of fleet is four. The Laboratory has no further plans to decrease its fleet size at this time.

4. Funding

Performance Status

In 2008 the Ames Laboratory initiated a Preliminary Proposal and Detailed Engineering Study in preparation for participation in an ESPC. No viable projects were identified and the ESPC was not executed. Currently the Laboratory is not participating in an ESPC.

As Energy Conservation Measures (ECM) are identified through energy and water use evaluations and audits, they are evaluated for efficacy primarily through simple pay back analysis. If the pay back is 10 years or less, the Laboratory prioritizes the project based on various factors including, but not limited to, ES&H risk analysis, deferred maintenance, progress toward Laboratory and DOE Sustainability and energy conservation goals. Once prioritized the project is evaluated for the appropriate source of funding whether GPP, Overhead or other, then submitted for budgetary prioritization and approval.

Energy use is the largest single factor affecting sustainability at the Laboratory. As such, the wise use and conservation of energy is considered in the development of all projects at Ames Laboratory whether the project is primarily for enhanced energy conservation or not. Those measures deemed cost effective are incorporated in the projects to help improve the sustainability of the Laboratory.

Summary of Sustainability Project Funding (\$K)

PROJECT	FY17 Actual	FY18 Planned/Requested	FY19 Planned/Requested
<u>Sustainability Projects</u>	\$431	\$1497	\$1480
<u>Sustainability Activities other than projects</u>			
<u>SPO Funded Projects (SPO funding portion only)</u>	0	0	0
<u>Site Contribution to SPO Funded Project</u>	0	0	0
<u>ESPC/UESC Contract Payments</u>	0	0	0
<u>Renewable Energy Credits (REC) Costs</u>	\$7.884	\$8.900	\$10.640

Note: Large increase in REC costs is due to new requirement to offset a portion of thermal energy with renewables.

Projected Performance

Ames Laboratory will continue efforts to integrate long-term sustainability goals into the budget process along with continued use of an overall funding strategy including return on investment analysis, prioritization methodology, the use of overhead and GPP funds. The conservation of energy and sustainability will be considered in the development of all projects at Ames Laboratory whether the project is primarily for enhanced energy conservation or not.

4.1 Training

Performance Status

In FY 2017 approximately \$1,300 was expended providing training to ensure the site Certified Energy Manager was able to renew required certifications for another 3 years and qualify for a 2 year renewal of a Professional Engineering license, demonstrating core competencies.

Projected Performance

Annual training will continue to be supported to ensure continued compliance with the Federal Buildings Personnel Training Act of 2010.

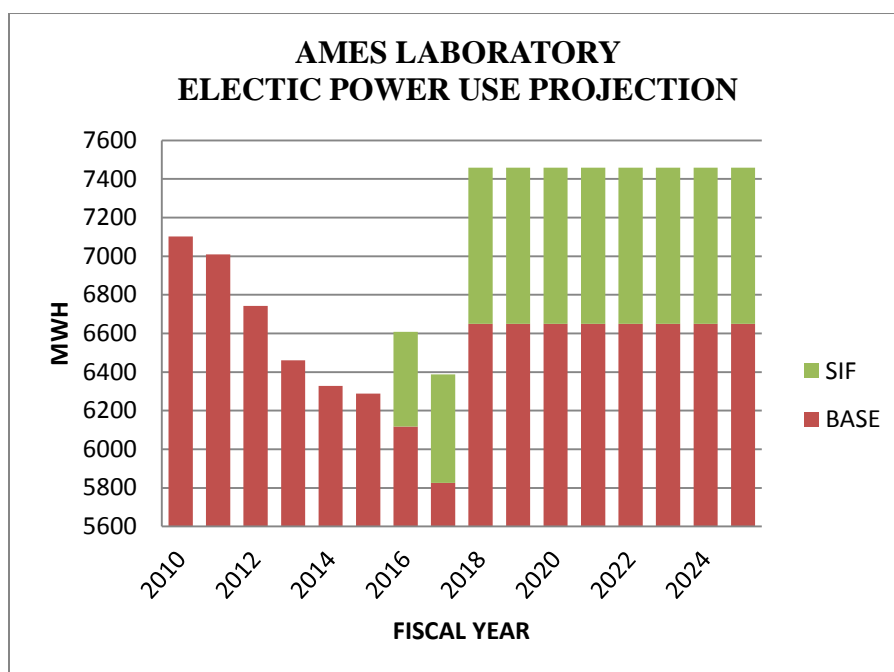
5. Electrical & REC Cost Projections and High-Energy Mission-Specific Facilities (HEMSFs)

Performance Status

Ames Laboratory does not currently have High Energy Mission Specific Facilities (HEMSF).

Projected Performance

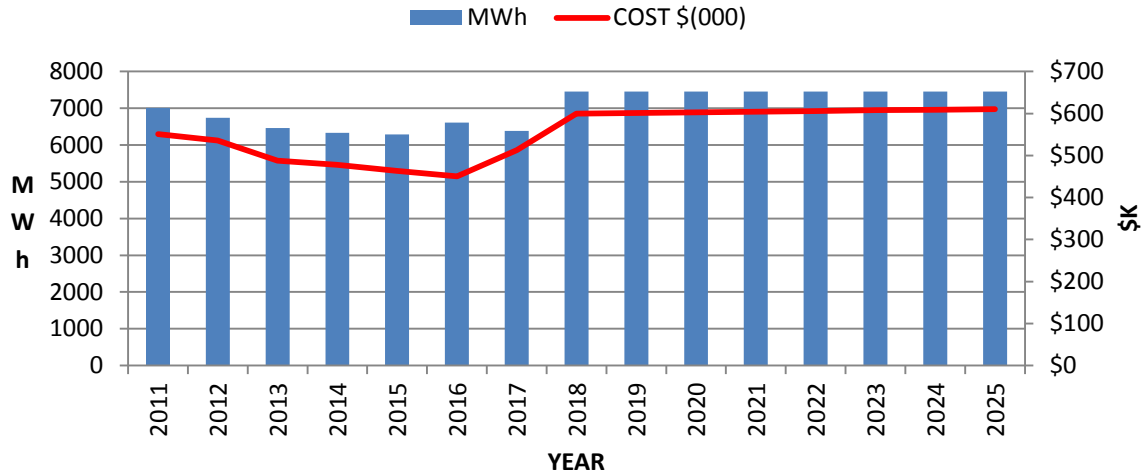
While Ames Laboratory does not currently have High Energy Mission Specific Facilities (HEMSF), the new Sensitive Instrument Facility (SIF) which opened in 2016 will impact the amount of electricity used by the Laboratory. Additional equipment installed in late FY 2017 in both the SIF and the data center in Wilhelm Hall which will come on-line in FY 2018 will have a noticeable impact on the Laboratory's electrical usage.



FY	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIF* (MWH)	0	0	0	0	0	489.3	810	810	810	810	810	810	810	810	810
SITE BASE (MWH)	7010	6742	6460	6328	6288	6118	5825	6649	6649	6649	6649	6649	6649	6649	6649

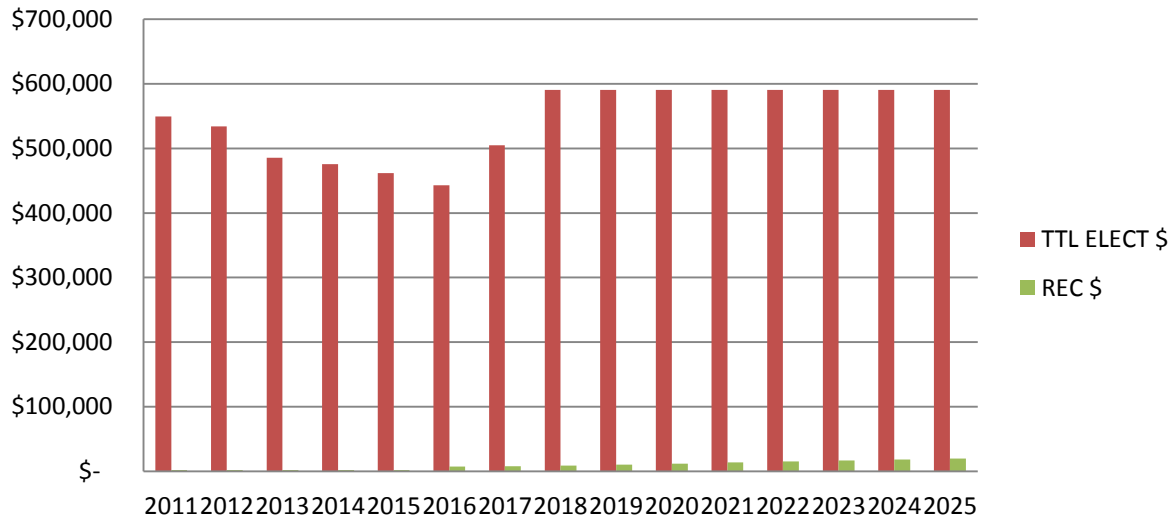
Once the added utility load of the SIF and the data center are realized the utility demand at the Ames Laboratory is expected to remain basically stable with a cost/kWh growth of 0% per year currently projected for the foreseeable future. The steadily rising cost is due to the increasing number of RECs required to be purchased to meet renewable energy and clean energy goals.

Ames Laboratory Electricity Use and Cost Projections



YEAR	COST \$(000)	MWh
2011	\$551	7010
2012	\$536	6742
2013	\$487	6460
2014	\$478	6328
2015	\$464	6288
2016	\$450	6607
2017	\$513	6387
2018	\$600	7459
2019	\$601	7459
2020	\$603	7459
2021	\$605	7459
2022	\$606	7459
2023	\$608	7459
2024	\$609	7459
2025	\$611	7459

Ames Laboratory Electric & REC Costs - Actual & Projected



YEAR	Electricity Cost	REC Cost – Inc. Thermal Offset
2011	\$549,274	\$1,995
2012	\$533,871	\$1,908
2013	\$485,670	\$1,820
2014	\$475,609	\$2,222
2015	\$461,473	\$2,205
2016	\$442,946	\$7,354
2017	\$504,865	\$7,886
2018	\$590,584	\$8,945
2019	\$590,584	\$10,697
2020	\$590,584	\$12,188
2021	\$590,584	\$13,940
2022	\$590,584	\$15,431
2023	\$590,584	\$17,183
2024	\$590,584	\$18,674
2025	\$590,584	\$19,941

The largest driver of electrical use at the Ames Laboratory is weather as we do not have any process or projects that are power intensive, save a data center located in Wilhelm Hall. The data center has been expanded and will have an increased impact on the Laboratory's electrical consumption in FY 2018 and beyond. The rising cost of the RECs is due, primarily, to the ever increasing percentage of clean, renewable energy we are required to purchase to meet sustainability goals.

Appendix A – Excluded Buildings List

The Ames Laboratory has no Excluded Buildings